GAS JOURNAL, MAR. 1, 1944

VOL. 243 96th YEAR No. 4215

EDITORIAL NOTES

DEFENCE OF RAW COAL

AND if anyone does not agree with me, said Mr. J. G. Bennett, Director of the British Coal Utilization Research Association, in an Address to the Fuel Luncheon Club (see later pages), I shall be glad to furnish him with full calculations to verify my statements. Whereupon he unloosed with extraordinary skill and pleasant grace of manner his statistical arguments in defence of burning raw coal in the domestic fire-grate of to-morrow—burning it in the cause of coal conservation, to boot, for he wants to shed the cold light of coal truth on the hypnotic mist, derived from propaganda on coal processing, which to his mind enshrouds discussion on thermal efficiencies and the like. Nor was Mr. Bennett in the least perturbed by dissentient notes which were faintly audible at the luncheon tables. Quite unruffled he smilingly proceeded to unfold with ease his statistical story and to advance his Q.E.D. to the fuel usage position. While disagreeing with his conclusions—or, rather, most of them—we thoroughly enjoyed the Address, which we hope will stir thought beyond the confines of the Club.

The Author's figures should, we think, be tested by fire—fire of a different nature from that so joyfully envisaged by Mr. Bennett. It will be seen from our report of his remarks that he is of opinion that, with present-day utilization equipment, overall efficiencies in use of the coal fire, the gas fire, and the electric "fire" are all very low and are all the same—viz., 16%. In other words, it does not matter how you tackle the heating problem by the open fire, only 16% of the heat of the original coal is, in fact, useful to the consumer. This idea of everything at 16% frankly does not appeal to us one little bit. But we ought to set out as simply as we can how this universal figure of 16% is arrived at by the Author. For the coal fire he takes a test efficiency of 24% (Dr. Margaret Fishenden) and an "availability factor" of 66%, giving a net of 16%. Turning to gas, he argues that we get 20 units of heat as gas from 50 units of heat in the form of coal—which reasoning we consider quite beside the mark. This is equivalent to a production efficiency of 40%, which is demonstrably wrong. He follows up by crediting an efficiency of 50% for a gas fire and an "availability" factor of 80%, thereby once again arriving at this dominant figure of 16%. And finally electricity. He gives a generating efficiency of 22%, knocked down to 18% by transmission losses, and reduced further by the "availability factor" to that very convenient 16%. All of which is very neat indeed, and we are asked to conclude that from the coal conservation point of view it doesn't matter a hoot whether we burn raw coal, gas, or electricity, that in each case we get only 16% out of the original coal, and that if we want to pay more for gas and electricity than we do for raw coal it's just too bad. That was the impression we gained of Mr. Bennett's picture of the situation to-day, and it seems to us a very peculiar one.

STRANGE BASES

AND what of the future? Mr. Bennett's thesis was that the use of house coal will continue, that it is neither practicable nor desirable to contemplate extensive replacement of house coal by gas or electricity unless these two industries can greatly increase their efficiency of production and reduce their costs, that research to this end should be prosecuted with the utmost vigour and on a much greater scale, but that, even so, in the outcome the present balance of consumption will not be greatly changed. We can expect, he said, that the present gas-works operating efficiency will be raised from 64% to 74% (this 64%, by the way, is a ridiculous figure for a well-run gas-works to-day) or, as an absolute maximum, 80%, though the latter figure "gives very little margin for stand-by losses," and a gas production efficiency of 50% or 60% is the "ultimate target," and the "highest efficiency we can hope for" for the gas fire is 28%.

But what of the coal fire? In this regard Mr. Bennett opened up to some tune at the meeting to which we have referred, lifting the curtain to reveal the rosiest of coal fires—an open fire which burns continuously day and night. A fire which not only has an efficiency of 45%, but can be closed down when the room is not occupied so that its "availability" goes up to say 80%, giving a net figure of 36%. How can gas compete? That was Mr. Bennett's argument, and his conclusion was that, if we think in terms of conservation of coal resources, the relative position of raw coal compared with gas and electricity will improve in the future; that if we were to come anywhere near the tendency to rely on gas and electricity only for our domestic needs, the effect on the cost of living would be disastrous. And as for the by-products of coal carbonization, the Author, saying there exists much loose thinking about this, swiftly dismissed their importance. After all, he remarked, the valuable chemicals—apart from benzole—derived from coal by carbonization represent less than 1% of the coal treated, and he maintained that there are better ways of getting valuable chemicals from coal. As for the smoke nuisance, "the natural way to solve this problem is to burn coal without making smoke and not to *waste a lot of coal in making smokeless fuels*." The italics are ours. Conserve coal by burning it in the raw state would appear to be Mr. Bennett's slogan.

A DIFFERENT PICTURE

AS we have said, we agree neither with the figures taken by the Author nor the conclusions which he draws from them.

Regarding the economic aspect, the convenience factor of gaseous fuel weighs very heavily, and it has been fully proved that the joint use of gas and coke in the home, giving a service incomparably better than that possible with raw coal, causes no financial disaster to the consumer, and in fact costs no more than raw coal. And let us examine for a moment this curious universal figure of 16% for heating efficiency. At the beginning of last year much information was given on the subject of the "fuel expenditure index" in the gas-making process—an index which is the relation of the potential energy in the raw materials used to the potential energy in the products for sale. A national "fuel expenditure index" of 26 was adduced, giving an efficiency figure of 74%. Now this figure is greatly exceeded by very many undertakings, and it does not represent "things to come." Even on a low average, again not representative of what can be done, when we use in gas-making 70 therms of fuel to produce 80 therms of gas we have an efficiency of gas production of 53%, and when we use this gas in, say, a fire at 50% the overall thermal conversion efficiency of coal to useful heat *via* gas is not 16%—it is 27%; and if we burn the gas fluelessly the overall efficiency is a matter of 50%. We prophesy without hesitation improvement in the foregoing figure of 53%, and a greatly extended use of gas, coupled with coke, at a cost to the consumer no greater than he would have to bear if he continued to burn raw coal and forego the convenience and cleanliness which gas undoubtedly affords.

Women's Gas Council

The formation of a branch of the Women's Gas Council at Dunfermline, recorded in a brief news paragraph in the "JOURNAL" last week, is of greater historic significance than might appear at first sight, in that it marks the opening of what in current language might be called the women's "second front" north of the Border. Relations between Scottish gas undertakings and their domestic consumers have never been less cordial than elsewhere in Great Britain, but it is a plain fact that for reasons best known to Scottish gas executives, or perhaps for no reason at all, the W.G.C. has had to wait until nearly its ninth birthday to see a branch actually brought into being. It will probably not now be long before other branches are established in Scotland, because a number of managers and sales officers, at a meeting held a few hours before the inaugural meeting of the W.G.C. branch, heard all about the energy put into its formation, and went back to the four quarters of Scotland with the matter fresh in their minds. This new development was made possible by the pooled enthusiasm of Mr. David Fulton, Chairman of the B.C.G.A. Management Committee for Scotland, Mr. E. G. Smith, Engineer and Manager at Dunfermline, Mr. Willie Anderson, who, besides being Sales Manager there, is widely known as a cricketer, and, of course, Mrs. Abbott, Acting Organizing Secretary of the W.G.C. Mr. Fulton enlisted the support of his colleagues in the national organizations, and Mr. Smith, who has only recently taken up his duties at Dunfermline, recognized that the splendidly equipped demonstration theatre at his headquarters would make an ideal centre for W.G.C. activities. When Mrs. Abbott addressed the initial meeting she shared the platform with Mrs. D. Thomson Kennedy, wife of the Provost, Mrs. Blair, head of the local W.V.S., Police Judge Miss Frew, and other leading lights in the city. A provisional committee was appointed to make preliminary arrangements, and already an attractive programme of meetings, lectures, discussions, and demonstrations has been arranged for the first season, with homes and home-making as their basic theme.

Personal

Mr. A. J. STICKELS, who retains his position as General Manager, has been appointed a Director of the Isle of Thanet Gas Light and Coke Company. Mr. G. MAY has been appointed Secretary and Accountant.

* * *

Mr. A. T. HARRIS, who has been Manager of the Great Wigston Gas Company for 41 years, has been elected to a seat on the Board of Directors. For over 50 years his father was Manager of the Company, and for over 50 years his grandfather was Manager of the Droitwich Gas-Works.

* * *

Mr. BERNARD A. BROWNE has recently undergone an operation in the Hampstead General Hospital. His many friends will be glad to know that he is making good progress towards recovery.

* * *

Mr. FRED DAVIES, Engineer and Manager of the Walsall Gas Department, has resigned on the grounds of ill-health, and Mr. S. BROCKBANK, the Deputy, is recommended as his successor in an acting capacity until the permanent appointment is made and the selected applicant has taken up his duties.

Obituary

Mr. BERTRAM WYBURNE ELLIS, a Director of the Oriental Gas Company for 25 years, during the last eight of which he was Chairman, died on Feb. 17. He was also a Director of the Bombay Gas Company and Auditor to the Commercial Gas Company. His father, the late Mr. H. D. Ellis, was for many years associated with the Commercial Gas Company, first as Secretary and later as a Director. Mr. B. W. Ellis resigned the chairmanship of the Oriental Gas Company last December owing to failing health, and was succeeded by Mr. George Evetts.

The Industry in Australia

During the first three years of the war many important changes took place in the Gas Industry in Australia and New Zealand. Sales of gas in Australia for 1942 were 11% above those for 1941, and 25% above the 1939 level. Over the three preceding years of peace the total increase was only 10%.

The magnitude of the Australian Gas Industry's contribution to the war effort through the provision of gas fuel for munition works and annexes, military hospitals, canteens, and other establishments, as well as for essential industries, is indicated by the considerable expansion of commercial and industrial sales. In addition the Industry met unprecedented demands for domestic purposes. Coke, tar and ammonia were produced in 1942 in quantities far above the pre-war figures.

The number of male employees in the Industry was reduced during 1942, but there was an increase in the number of female employees. The total salaries and wages paid exceeded payments for 1941.

In New Zealand also the sales of gas for 1942 were much higher than for 1939.

The figures on which this information is based represent the most complete statistics available for the Australian Gas Industry, information having been provided by 81 undertakings representing 98% of the total gas made in Australia. Fifteen New Zealand undertakings, representing 75% of the total gas make, also supplied statistics.

Manchester's Model Houses

To enable the public to air their views and criticize post-war housing schemes, the Manchester Housing Committee has built in the showrooms of the Gas Department full-size models of the ground floors of two houses of types which the Committee intends to construct on selected sites in the city. Each comprises a living room, kitchen, and utility room; in one model the living room has a dining recess of 89 sq.ft., and in the other a dining recess large enough to seat five people is provided in the kitchen. Both models are equipped with gas appliances for heating, cooking, clothes washing, water heating, and refrigeration, while a bayonet fitting for a gas poker in each of the living rooms suggests alternative fuels where desired.

Visitors, of whom there have been an average of over 13,000 per week since the exhibition was opened by Mr. H. U. Willink, Minister of Health, last month, are encouraged to ask questions and offer suggestions, and for the latter purpose they are handed a questionnaire in which they may express their preference for one or other model, their dislike of any feature, and their ideas as to the size of the rooms, the method of wall decoration, and other characteristics.

The exhibition, designed by Mr. J. Hughes, Director of Housing, in co-operation with Mr. J. H. Cadman, Commercial Manager and Secretary of the Gas Department, will remain open for some months.

Model "B" kitchen, equipped with coke boiler, gas circulator, gas point for iron, curling tongs heater, or gas poker, gas cooker with ventilation hood, refrigerator, boiling water type sink water heater over a stainless steel sink and draining tray, and a gas meter fitted into a prefabricated steel meter and tradesmen's hatch unit.

Diary

Mar. 3.—London and Southern District Junior Gas Association: Gas Industry House.
Mar. 14.—National Federation of Gas Coke Associations: General Committee, Gas Industry House, 10 a.m.
Mar. 14.—National Gas Council Central Executive Board: Gas Industry House, 2 p.m.
Mar. 14.—British Gas Federation Council: Gas Industry House, 3.30 p.m.
Mar. 21.—Southern Association: Committee, 11.30 a.m.; Luncheon, 1 p.m.; Annual General Meeting, 2.30 p.m. Holborn Restaurant, W.C. 1. Presidential Address of R. C. Taylor, M.B.E.
Mar. 25.—Western Junior Gas Association, Bristol: Paper on "High Pressure Storage and Distribution," by B. G. Hawkins.
Mar. 29.—London and Southern District Junior Gas Association: Gas Industry House.
April 5.—Southern Association (Eastern District): Gas Industry House, 2.30 p.m. Paper by W. K. Tate, M.A., Assoc. M.Inst.C.E.

New Benzole Recovery Plant

A benzole recovery plant (activated carbon process) designed and made by Sutcliffe, Speakman & Co., Ltd., of Leigh, was inaugurated on Jan. 27 at the Leigh Gas-Works by the Mayor (Councillor W. Kearney, J.P.).

A feature of the plant is that it is entirely automatically controlled; this is a recent development, and obviates the constant presence of an attendant. The members of the Gas and Water Committee were present, along with Councillor J. D. Speakman, Joint Managing Director, Major Gubbins and Mr. C. M. Richardson, Directors, and Mr. W. E. Edwards, Departmental Manager of Sutcliffe, Speakman & Co., Ltd., and Mr. W. S. Martlew, the Engineer and Manager of the Gas-Works.

Alderman W. Grundy, J.P., the Chairman of the Gas and Water Committee, said he was very pleased that the extension was one of the products of a local firm—Sutcliffe, Speakman & Co. The extraction of benzole would also mean the extraction of sulphur, and the result would be that their gas would be purer. They had no hesitation in recommending that type of plant.

The Mayor (Councillor W. Kearney, J.P.) said he hoped that it would be the forerunner of many more plants by Sutcliffe Speakman. If they were going to produce those plants it would mean more work for the people of the district. He could not understand why Leigh, Atherton, and Tyldesley should not join together and have one large gas-works to supply the whole of the Leigh district. All three ought to meet together to discuss the matter.

Dr. M. Barash, of the Ministry of Fuel and Power, said he had been fortunate in seeing every benzole plant started in the country and the number was in the hundreds, of which forty were of this particular type. The Ministry were pleased with the present type of plant. It was a beautiful piece of work, and it was a 100% British and a 100% Leigh plant. The Leigh Gas-Works was to be congratulated on having the plant put in. The financial aspect of the process had been considered seriously. He had had the pleasure of seeing the Chairman, Vice-Chairman and the Gas Engineer, and showing that from the financial aspect it was a very attractive process.

As an assurance to the Chairman, he was convinced that there would be no doubt as to the disposal of benzole profitably after the war.

Councillor J. D. Speakman regretted that Mr. Sutcliffe was not there. He thanked the Mayor, the Chairman of the Committee, and Dr. Barash for the kind words they had said about his firm. They had for many years been working on the problem of recovering volatile gases and vapours, one of which was benzole; and as soon as they had the opportunity of recovering benzole they naturally, as go-ahead business people, seized the opportunity, and they had during the last few years been able to develop that benzole recovery to the benefit of the country and Leigh. Dr. Barash's statement should convince any unbiased person that the recovery of benzole from the town gas was a very good proposition now and in the future.

Councillor J. Stevenson, Deputy Chairman of the Gas and Water Committee, in moving a vote of thanks to the Mayor, said they in Leigh had a right to be proud of their gas-works, which was offering to its customers lighting and heating service which was convenient and economical. He thought they would agree that the Leigh Gas-Works was a highly successful municipal enterprise, offering essential service to the community. Their policy was to stimulate improvements and support their esteemed Gas Manager, Mr. Martlew, who, by his enterprise and technical skill, combined with the loyal co-operation of his staff, controlled their works most efficiently. The Atherton Gas-Works, of which Mr. W. T. Duxbury is the Manager, had a similar plant made by Sutcliffe, Speakman & Co. put in twelve months ago, and it was doing excellent service. During the year they produced over 22,000 gallons of high-class benzole.

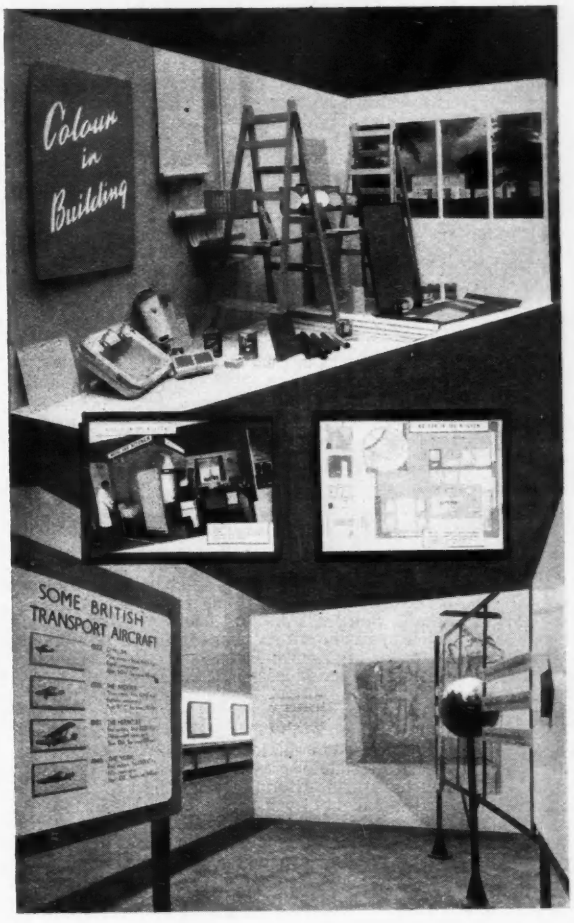
Co-ordination Between Engineering Institutions

In his Presidential Address to the Society of Engineers Mr. Frank Parfett spoke on the subjects of the education of young engineers, and the need for co-ordination between Engineering Institutions in the general interests of engineers.

As a product himself of the apprenticeship system operated in the Royal Naval Dockyards, he reviewed with approval the schemes now in operation in a large number of companies, urging that from them we could deduce a general minimum plan for operation by all employers accepting engineering apprentices. He welcomed the proposals of the Education Bill now before Parliament in so far as they raised the school-leaving age and provided for continued education up to the age of 18. After this age, apprentices who showed no aptitude for theoretical work were better left to develop in the factory, where they could become efficient and useful mechanics. They were not to be regarded as lost souls, and he did not suppose that the inventor of the zipp fastener had need of a table of logarithms. But apprentices with abilities for higher scientific training were the blue-eyed boys of the profession, and should receive every encouragement, even as far as the Universities, where special aptitude was shown. Only by having a larger proportion of engineers with such higher training could we hold our own in the post-war period, and bridge the gap that so often existed between the laboratory and the final product of the factory.

Urging young engineers to take the qualifying examinations for membership of the Institutions, Mr. Parfett said the time might well come when the use of the term "Engineer" would be restricted to those who were so qualified and who were accepted by one of the Institutions. That policy had already been adopted by most of the other professions.

With regard to co-operation between Institutions, Mr. Parfett contrasted the position in this country with those in the United States and South Africa, where the Institutions shared a national building. Certainly our own Societies and Institutions were on a friendly relationship, but while we had been very good neighbours, we had taken care to maintain our garden fences. A Committee was now in being to devise a formula for co-operation, so that many problems that were of general importance to engineers, regardless of their special branches, might be dealt with and a common policy settled.



The Royal Academy Exhibition of the British Colour Council contains a large coloured composite photograph and plan of the Gas Kitchen and Utility Room designed by Frederick McManus, A.R.I.B.A., for the British Commercial Gas Association. In the domestic section an Ascot gas water heater forms part of a novel display of kitchen and bathroom fittings and decorating finishes.

Dividends

Plymouth and Stonehouse.—Interest at the full rates on the 3%, 3½%, 4% and 5% Debenture Stock, less tax, to be paid on April 1 (as last year).

Bristol.—Final on the General Capital Stock at 5% per annum for the half-year to Dec. 31, 1943.

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THE LITERATURE OF THE GAS INDUSTRY

T. A. TOMLINSON

IN the preface to the first edition of his *Modern Gasworks Practice*, dated November, 1916, Alwyne Meade wrote: "The Gas Industry in this country, in spite of its magnitude, is particularly ill furnished with anything in the nature of a general work of reference dealing with really modern practice. The deficiency, however, can be readily understood when consideration is given to the immensity of the task with which the intending author is faced, the sacrifice of time involved, and, above all, the difficulty of keeping pace with principles and ideas which are in a perpetual state of development." In the preface to the second (1921) edition he wrote: "Preparation of the second edition has, if anything, been more exacting than the compilation of the first; for in the past four years the technique of gas-works methods has undergone nothing less than an upheaval. As a result, the greater part of the material contained in the original edition has had to be rewritten. Moreover, the present volume has undergone an increase in bulk of 50% as compared with its predecessor; and, as yet, there is no indication as to when finality in this direction may be reached." These sentences, written by the only contemporary English gas engineer who has attempted the task of writing a complete treatise on the technique of town gas manufacture, are a sufficient indication of the difficulty of keeping pace with the adequate provision in book form of the reference required by engineers engaged in the design and operation of the appliances used to-day in the manufacture and supply of town gas.

Forty years ago King's Treatise, already scarcely ever read, occupied an honourable place in the gas engineer's bookcase. Thomas Newbigging's Handbook (*The Gas Manager's Handbook*), which had appeared in 1870, was in its fifth edition, dated 1889, under the more pretentious title of *Handbook for Gas Engineers and Managers*. But from about 1910 revolutionary changes began to take place in gas manufacture, changes which culminated in the Gas Regulation Act of 1920. Books prior to that date had become definitely obsolete. What books have since become available which may be regarded as useful reference?

W. B. Davidson's *Gas Manufacture*, published in 1923, was a scholarly attempt to compress extant knowledge into one convenient volume. But it must be remembered that a book published in 1923 was probably compiled and written in 1920, so that it is not surprising that much of the subject-matter is already out-of-date.

In 1921 Alwyne Meade produced the second edition of his *Modern Gasworks Practice*, which he correctly described as "entirely rewritten and greatly enlarged." But in 1934 he produced the first volume of yet another complete revision to his book. Apologizing for the length of the interval between the appearance of his Second Edition and the *New Modern Gasworks Practice* he wrote: "The necessity for this long delay will be familiar to all of those acquainted with the revolutionary changes in the technique of gas manufacture which have taken place in the last decade. This period has, indeed, been marked by so continuous and rapid an evolution of plant and processes that it would have been most inexpedient to have issued a new work at a time when it could have been of little more than ephemeral interest. The author, therefore, decided to wait for a time when the Gas Industry had technically reached a state of greater quiescence, thus making it possible to commit to permanent form facts and figures which could at least be expected to remain of value for some few years." Alas! the task proved too much for one man and the new work stopped short at Volume I dealing, in detail, only with the retort house and its appurtenances of coal and coke-handling plant.

In 1934, too, the first volume appeared of a projected work, *The Manufacture of Gas*, under the editorship of H. Hollings. It deals with the subject of water gas and was written by R. H. Griffith. No further volumes have as yet appeared.

And the same year saw the first two volumes of A. Coe's work on *Gas Supply*, of which Volume III followed in 1939.

Technical Data on Fuel, published by the British National Committee of the World Power Conference and edited by H. M. Spiers, appeared first in 1928 and has become indispensable to the fuel technologist. It is already in its Fourth Edition with a Third Impression dated 1942.

The list is not exhaustive, and it is clear that the period 1920–1935 was relatively prolific in books relating directly to the technique of town gas manufacture. During the same period similar activity is discernible in the U.S.A. In 1931 J. J. Morgan produced Volume I of *A Text-book of American Gas Practice*, followed by Volume II in 1935. These represent a second and completely revised edition of his earlier work, which had begun to appear in pamphlet form in 1925 and was later reprinted bound. Already the team spirit in much American work of this kind is making itself evident. In the first edition the author acknowledges the "active co-operation of a special Committee of the American Gas Association," and the names of the members have an honourable place on the title-page.

In 1929 there appeared the third edition of a book produced in a new way. It was the (American) *Gas Chemists' Handbook*, prepared by an *ad hoc* Committee of the American Gas Association. The (American) *Gas Engineers' Handbook*, which appeared in its latest form in 1934, was prepared in the first place by the Gas Engineers' Handbook Committee of the Pacific Coast Gas Association, and later reviewed and adopted by a special Committee of the American Gas Association.

Our American colleagues were always alive to the necessity of constant revision of their text-books and two sub-committees were soon at work. *Combustion*, a treatise on gas-fuel, arose out of an "Industrial Gas Series" prepared under the supervision of the Industrial Gas Section of the Association. It was superseded in 1940 by *Fuel-Flue Gases*, a full-dress treatise on the chemistry and physics of fuel gases prepared under the auspices of the Chemical Committee. The original issue was sold out within less than 18 months. The book was reprinted during October, 1941, with a number of additions and corrections, and already a further revision is in hand. In the meantime the Sub-Committee on Revision of the *Gas Chemists' Handbook* was at work, and the *Gas Chemists' Book of Standards for Light Oils and Light Oil Products* appeared in 1943, followed in the same year by the *Gas Chemists' Manual of Dry-Box Purification of Gas*.

The two last books brought to fruition a new method of preparation, no doubt adumbrated by J. J. Morgan's work previously mentioned. The composition was no longer divided equally among members of the Committee; it was entrusted to one author whose manuscript was reviewed by the members of the Committee, who collaborated fully and freely in the final composition. "Further collaboration and guidance were secured from the authorities listed in the author's preface."

This Sub-Committee has no fewer than seven other handbooks in various stages of preparation.

A quotation from the Foreword to *Light Oils* may conclude this brief summary of American books: "Technical handbooks are indispensable tools. They are written to convey information and to offset shortages of man power. They reduce the time required to train practical technicians."

It is not proposed to attempt to give an account of the books available in German on this subject. Evidence that the German Gas Industry is alive to the necessity for new books was given by the appearance in 1937 and 1938 of two volumes, Volume VI, *Technical Gases and their Properties*, and Volume I, *Gas Producing Plant*, of a new Handbook of the Gas Industry projected by the Karlsruhe Gas Institute under the Editorship-in-Chief of Dr. Ing. Brückner. Other volumes were to deal with producers, purification, storage with measurement and distribution, analysis of coal, coke, gas and by-products, and administration, &c. In Volume I the description of the several types of gas-making plant are written each by a different specialist, but Volume VI is compiled by the Editor-in-Chief.

What then are the inferences to be drawn from the foregoing account of our own literature and that of our most important contemporaries? It is suggested that they are as follows:

(1) The British Gas Industry is relatively ill-equipped with up-to-date reference books.

(2) The task of writing a complete treatise on town gas is clearly too heavy a task for any one man.

(3) It is also clear that more than one book is necessary to cover this vast subject.

(4) The experience of our American colleagues suggests that for each book the combination of a single author with an actively advisory committee is the best way of securing homogeneity of style and treatment combined with the widest possible collaboration of expert knowledge and opinion.

The positive necessity for the production of a standard work of reference for the British Gas Industry seems to be self-evident. And by a standard work of reference is not meant class-books for students. A standard work should be one to which the engineer, the chemist, the teacher can refer with unqualified confidence for soundness of principle, correctness of essential detail, width of experience, maturity of judgment. Its characteristics should be authority, completeness, proportion. Its limitations should arise only from the limitations of the subject, not from the special requirements of a particular group of readers. Under the wise guidance of good teachers such a work would ultimately become of far more value than class-books to students themselves. Authors would do well to keep in mind a remark by J. R. Partington and W. G. Shilling in the preface to their unique book on *The Specific Heats of Gases*: "Had we written for elementary students a different course would have been desirable, but students were not our prospective clients, and the peculiar difficulties of the undeveloped mind have not stayed our hand at any point."

This is not, of course, to decry class-books as such. But it is suggested that once the technical handbook is written the class-book can be left to the teacher or lecturer, who is better qualified to write this type of book than the engineer. In practice it would probably be found that the teacher would use his own lecture notes brought up to date year by year and circulated among his students. Only in

particular cases would these notes reach the more permanent form of a book.

The financial aspect of this question needs careful consideration. Clearly the approach must be on broad and generous lines. It requires no demonstration that the proceeds of the sales of the books here contemplated cannot cover more than a fraction of their real cost. There must be very few modern technical books which have paid for more than the cost of printing, binding, and distribution. The actual writing has been a "labour of love" carried out with the willing consent of the writer's employer and, therefore, very largely paid for by the employer in the interests of the Industry. The provision and preparation of illustrations—photographs, drawings, diagrams, etc.—has been financed in a similar manner.

The composition, preparation and publication of the series of books here visualized would have to be financed by the Industry as a whole. The only fair and honest policy is for it to be entrusted to a Committee of the Institution.

It is useful at this point to consider books in relation to the literature of the British Gas Industry as a whole. The literature of our long-established but still rapidly developing Industry consists, or should consist, in the following elements:

(*a*) A very large number of monographs in the shape of papers and articles differing widely in authority and scope, which deal with some particular apparatus, process, or technique, or give a more or less individual view of the technology or administration of a limited section of the Industry. These papers and articles are recorded chiefly in the Proceedings of the professional and technical institutions and associations or in the technical Press.

(*b*) A less number of papers in the form of Reports of the Fuel Research Board, Research Associations, *ad hoc* Committees, and similar bodies, which are of an authoritative character but still deal with limited and often very specialized sections of the subject. This class of publication may be recorded in the Proceedings of the Industry's technical bodies and its technical Press, but frequently remains in independent form.

(*c*) The relevant Specifications and Codes of Practice issued by the British Standards Institution, representing agreements as to standard practice which frequently concern other industries besides our own.

(*d*) Bibliographies and volumes of abstracts, which classify and make more readily accessible the whole literature of the Industry.

(*e*) Books, into which the generally accepted principles, fully-established data, methods, and practices are crystallized out. They may be subdivided roughly as follows:

(1) Data books.

(2) Laboratory and operational handbooks.

(3) Discursive books dealing with descriptions of plant, together with the enunciation and application of principles, and with science in so far as may be necessary to show its application.

(4) Another kind of book which is really class (*a*) extended to book form is a lengthy monograph on some aspect of the Industry dealt with in an entirely individual manner. Examples in the literature of the Gas Industry are Lewes' *Carbonization* and Chantler's *The British Gas Industry*.

There is also, of course, a multitude of ancillary scientific or technical books which may include specific references to the Gas Industry, but are fundamental to many industries, and cannot properly be classified as part of the literature of our own.

At present the staple of the Industry's literature is included under (*a*) or (*b*), and the latest expressions of the best thought or enterprise will always and necessarily be in these classes. But this information is in relatively fugitive and scattered form. In class (*a*), in particular, the vast amount of permanently valuable work tends to be engulfed in vaster amounts of which the value is ephemeral or negligible. It is a physical impossibility for most technical men to keep in touch with all the literature with which it is desirable that they should be acquainted. But it is necessary that this information should be made much more accessible than it is. It is understood that this task will be undertaken by the Gas Research Board, who, it is hoped, will set up a Bureau of Information, and to whom we may look for the periodical issue of Abstracts. Such bibliographies and volumes of abstracts are beyond question a necessary and distinct part of our literature, but it is an exaggeration at present to classify them as having separate existence. They should be periodical in form, or, at any rate, frequently revised. True, Bibliographies exist at present chiefly as fixed appendices to other classes of literature. But what the writer has in mind is a separate series of Abstracts covering not only our own but the literature of other industries in so far as it affects the Industry served. Adequate classification and cross-referencing is desirable. To what extent the compilers of bibliographies as such may allow themselves a critical selectiveness, within the scope of the subject, in the items they include is a difficult question upon which it is not proposed to embark. In any case bibliographies can be used to the best advantage only by the critical and well-instructed. In themselves they provide no norm by which they can be judged. Within the literature of the Industry such a norm can only be provided by good books.

Books obviously constitute, or should constitute, the necessary consolidating element in the literature. There is a clear distinction between the fully accepted principles and data which should form the content of a book and the more speculative views which are properly expressed in single papers and articles. In view of the mass of material available only such detail of apparatus should be included in the book as may be necessary to illustrate the principles. The individual paper, on the other hand, may describe a particular piece of apparatus in such full detail as would be out of place in the book. From another point of view the book should describe the essential points of methods of operation, whereas the individual paper can discuss in full the operation of a particular piece of apparatus.

It is not proposed to attempt to give a detailed synopsis of the series of Handbooks which might be written. It is considered that a sharp division between chemistry and engineering as visualized in the American books is not one which would commend itself to British gas engineers.

In general terms the following are the books which it is suggested would meet the requirements:

(1) *Data.*—This volume should include such of the information in *Technical Data on Fuel* as is applicable to gas manufacture and distribution; give brief directions for gas, coal and coke analyses and other routine tests; data relating to refractory, building and engineering materials, and to such steam and electrical equipment as may be found on the gas-works.

(2) *Carbonization.*—This volume would be more concerned with the principles of carbonization and the routine regulation and adjustment of settings than descriptions of particular plant, which would only be so far described in their typical forms as necessary to illustrate principles of the subject. Data relating to coal and coke-handling plant should be included in this volume.

(3) *Water Gas.*—This volume would be conceived on lines similar to those of Volume II. It should include producers, "complete gasification," and similar plant.

(4) *Purification.*—This volume would be conceived on similar lines. The data would be supplementary to that included in Volume I. Directions for operation and control would form an important feature. Both wet and dry purification would be included, together with tar and liquor treatment and benzole recovery.

(5) *Exhausters, Works Meters, and Governors and Storage* could be dealt with in one volume.

(6) *Scientific Control* would include descriptions of apparatus detailed only as far as necessary to illustrate the principles involved. Again data supplementary to Volume I would be included.

(7) *Distribution.*—This is a very large subject, covering mains and services, meters and governors, high and low pressure distribution, main laying in various sub-soils, &c. &c.

(8) *Gas Utilization*, domestic and industrial, would include all the forms of apparatus applying gas and coke to space and water heating, cooking and lighting, industrial furnaces, boilers and street lighting. It is possible that two volumes might be required adequately to cover this vast subject.

(9) *Administration* would cover sales and tariffs, works and office equipment, and finance generally.

It is suggested that a sub-committee should be empanelled to deal with each of the above-mentioned nine sections of the subject, but that each book should be written by one specialist, collaboration of the members of the sub-committee, and of all other interested and authoritative persons being exercised in a manner similar to that of the preparation of the American book on *Dry Box Purification* referred to above. It is possible that a happily-chosen Editor-in-Chief would impart to the series that homogeneity of style and treatment to which we have already referred.

Smith Meters, Ltd., inform us that Mr. G. D. Bidwell, for many years with Lighting Trades, Ltd., has now joined their organization in the capacity of Selling Agent in the southern area, which he will work in conjunction with Mr. R. E. Treen.

The Report and Accounts of the Metropolitan Gas Company of Melbourne for the year ended June 30, 1943, just to hand, show that the net profit for the year was £157,615, £10,000 was transferred to reserve fund account, and £84,998 was carried forward. A final dividend of 5s. per share was declared. The total make of gas was 7,221,332,000 cu.ft., including 1,730,642,000 cu.ft. of water gas, and the total sold and used was 6,598,993,000 cu.ft., leaving 622,339,000 cu.ft. unaccounted for.

Treasury Sanction has been obtained by the Oxley Engineering Co., Ltd., for the issue of 300,000 new ordinary shares of 5s. at the price of 8s. 6d. per share for the purpose of acquiring the business of Thomas Dryden & Sons, Ltd., mechanical and electrical engineers and iron and brass founders, of Preston. Founded in 1871, the Dryden Company has specialized in foundry work and machining, and the Oxley Company, founded in 1895, whose normal business is the manufacture and erection of electrically welded purifiers, gasholders, storage tanks, chemical plant, and oil installations, specializes in electric welding. It is proposed as soon as possible to create a welding department at the works of the Dryden Company, where a competent staff will be able to undertake gasholder repairs in the surrounding district, thereby rendering more prompt attention and overcoming transport difficulties. The present Oxley Company was incorporated in 1937 with a nominal capital of £100,000 in ordinary shares of 5s. each. The nominal capital has now been increased to £200,000. Mr. H. H. Hollis, Chairman and Managing Director of the Oxley Company, is also Chairman of the Dryden Company.

HAS COAL A FUTURE FOR SMALL-SCALE USES?*

By J. G. BENNETT, Director, B.C.U.R.A.

WHEN it was announced that I was to address the Club on the future of coal for small scale uses, a kindly disposed friend said to me, "Surely you are not going to make a reactionary speech about the virtues of raw coal!" He seemed to think that there is something savage, almost cannibal, about the thought of consuming *raw* coal. We tend to regard it as one of those breaches of good taste, the impropriety of which is accepted without need of proof.

So strong was this feeling before the war that I know that many people expected the coal fire to go the way of the bustle and frock coat into the limbo of Victorianism. I think that we were all of us hypnotized by our own propaganda in favour of coal processing, and we did not always stop to calculate what was really implied in terms of the conservation of coal resources, the vagaries of our climate, and last, but not least, sheer economics.

I shall examine the future prospects of solid fuel under these three heads, and you must forgive me if, in the short time available, I make some apparently dogmatic assertions without giving you the detailed proof. I shall, however, be glad to furnish the full calculations to anyone who wishes to verify them for himself.

We can take the three main ways in which coal provides heat for small scale uses—that is, in the form of solid fuel, of gas, and of electricity. To simplify matters, I shall consider only the case of heating the living-room in a private house, although a complete discussion would need to bring in other domestic applications and also the small scale industries, as well as shops and catering establishments.

To start with coal used in the raw state, which is the oldest form and still predominates. The coal fire as tested by Margaret Fishenden has an efficiency of about 24% in terms of radiation only. That is the normal present-day coal fire. As living-rooms are not occupied all day and the coal fire cannot be turned on and off just when wanted, there is a certain amount of unnecessary heating. Also, the effective efficiency in a house will be lower than the test efficiency. If, to allow for all this, we take an "availability factor" of 66%, no one is likely to disagree, especially bearing in mind the value of the extra heat given to the fabric of the building, for which credit is not usually given, although it is quite important with our damp winter climate. This gives an effective net efficiency of 16% for the present-day coal fire. Improved fires are, however, already on the market, including some with convection heating, which show efficiencies of 30–35% gross, and over 20% net. The future, however, holds out still further possibilities. Experimental coal fires are in existence which not only have an efficiency of 45%, but can be closed down when the room is not occupied, so that their availability goes up from, say, 66 to 80%, giving a net figure of 36%, or more than double that of existing fires. Even this does not represent the ultimate target, for it is possible to extract another 10% of heat from the flues by taking warm air into upper rooms, so that we may ultimately hope to see raw coal burned with a net efficiency, after making all deductions for availability, of some 45%.

Now let us consider gas. Before gas reaches the home it has had to be made at a gas-works, where there have been losses in the form of heat used for heating the retorts, and there have been losses of gas from holders and mains. A further source of loss in the Gas Industry arises from the need to keep a proportion of carbonization plant heated up ready to meet sudden changes in demand, because gas can only be stored to a limited extent. I have seen many figures for the actual working efficiency of gas plant in this country, and I think that most gas engineers would agree that 64% can be taken as a fair average figure for the whole country at the present time, or before the war. In other words, 36% of the heat in coal that goes to a gas works is lost in one form or another. Of 100 heat units in the coal, 20 appear in the form of gas, 40 as coke, and 4 as tar, and 36 are lost. Now if we assume that coke can be used with a 15% greater efficiency than coal, we can allocate 6% of the losses to coke, leaving 30 to be borne by the gas. We cannot debit coke with more than its efficiency justifies, because it is a solid fuel which has to compete with coal. I think that most people would agree that on account of its relative inflexibility coke has a lower availability factor than coal.

This means that we get 20 units of heat in the form of gas from 20 plus 30—*i.e.*, 50 units—of heat in the form of coal. This is equivalent to an efficiency of a production of 40%. This may seem very startling to you, but the calculations can easily be verified. I think it is generous to take the thermal efficiency of the *average* present-day gas fire at 50%; we are left with a gross efficiency for gas heating of 20%. The "availability factor" of gas fires is, say, 80, and this gives a final figure of 16%, or just equal to the normal present-day coal fire.

Turning to future possibilities, we can expect that the present gas-works operating efficiency will be raised from 64 to 74% or, as an absolute maximum, 80%, though this latter figure gives very little margin for stand-by losses which are unavoidable with varying load. Similar calculations to those I have just been making give a gas production efficiency of 50 or 60% as the ultimate target.

It is very improbable that the efficiency of the gas fire can be raised above about 65%, and its availability made higher than 90%. This gives us prospective efficiency of the gas fire, the highest we can hope for, of 28%, and an ultimate figure of 33% as compared with the coal fire's ultimate target of 45%.

I should not, however, omit mention of the "flueless" gas heater, which can give much higher efficiencies than the fixed gas fire. It is generally agreed that the flueless gas heater will only become popular if the Gas Industry carries sulphur removal to the utmost limits, and I do not know what effect this would have on the cost of gas. In any case, I cannot really visualize the family spending the evening sitting round a flueless gas heater. I would not want to do it myself.

Next comes electric heating. The average efficiency of electric generation at all power stations in this country is 22%. After allowing for the transmission and transformation losses, the final efficiency reaching the domestic consumer is of the order of 18%. I do not think we can assess an efficiency higher than 95%, or an availability factor higher than 95%—it cannot be higher because when you leave a room after having used an electric heater, the stored-up heat ceases to be "available" in the sense I have been using the term. This brings the electric heater down to 16%, and we have the remarkable conclusion that, at the present time, it is almost indifferent from the point of view of coal conservation whether you use gas, electricity, or raw coal.

When, however, we turn to the future, the possibilities of increased efficiency of electricity generation are clearly limited with power stations of present type, and we are unlikely to see any revolutionary changes for many years to come. If all the older power stations were eliminated and replaced by new stations as efficient as Battersea or Brimsdown, we should have an absolute maximum of 30% generating efficiency or 25% as delivered to domestic consumers. Assuming an efficiency of electric fires of 100%, and an availability of 95%, we come to a figure of 24%, which, remarkably enough, is only three points below that which we found for gas. I have not time to speak about district heating, but it is generally agreed that, at the best, this has only limited applications, and its adoption would not alter the broad picture.

I think you will agree that these figures are very instructive. On present-day performance there is little or nothing to choose, as far as coal conservation is concerned, between coal, gas, and electricity. Looking forward to the best that can be achieved in the way of improvements either in sight or which have reached an actual experimental stage, gas and electricity can hope to increase from their present average working efficiency of 16% up to 24 and 33% respectively, whereas coal can hope to increase to 45 or 50%. These results should not really be surprising, because research into the use of coal for space heating has been far less intensively cultivated in the past than the corresponding work on the production and utilization of gas and electricity.

The conclusion to be drawn from the first part of my analysis is that the relative position of coal, that is *raw coal*, compared with gas and electricity will improve in the future, if we think in terms of conservation of coal resources.

I can deal very briefly with the second point—that is, the problem of energy supply and distribution, having regard to our climatic conditions. Nearly a year ago Sir John Dalton dealt before the Club with this same point in a very bold manner, and showed how important it is to take advantage of the fact that coal can be stored at collieries, at coal merchants' sidings, and especially in private cellars to meet the sudden peak loads which are caused by cold spells in the winter. Between two successive weeks of mild and of biting weather, there is an increase of more than 100% in the domestic consumption of heat. This can easily be understood if we take account of the fact that the difference between indoor and outdoor temperatures can easily be doubled overnight. Since neither gas nor electricity can be stored through the winter to meet these sudden peak demands, it seems to me to be clear that solid fuel has an indispensable function to fulfil unless we are to have an immense amount of idle capital tied up in stand-by carbonization and electrical generating plant.

Finally, we come to the question of economics. When we take into account both the cost of processing and also the losses inherent in the production of gas and electricity, it stands to reason that energy in these two forms must be more expensive than energy in the form of coal if all three are initially supplied from coal at the same cost per ton. In point of fact, at the present time I am paying 3d. per therm for coal, 1s. 6d. per therm for gas, and 4s. 8d. per therm for electricity, and I suppose that this is a fairly normal state of affairs for most people in London. It is not only the high processing costs of gas and electricity that places them at a disadvantage, but also the higher cost of distribution. It is generally recognized that by far the cheapest way of transporting energy is in liquid form through pipelines. Unfortunately we have little or no oil of our own. The next best is coal in ships, then coal by rail, gas and electricity being both far more expensive except for very short distances indeed. It has been said that the costs of retail coal distribution are high, but if we calculate them on the basis of pence per therm, we see that they are far lower than either

* Address to the Fuel Luncheon Club.

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gas or electricity. Even so I believe that they can be reduced after the war.

After all I have said about coal conservation, about energy supply and distribution, and about economics, you may expect me to reach the conclusion that the domestic uses of gas and electricity will decline, or, at any rate, will not advance. This is not my view at all, because gas and electricity have one outstanding advantage which we have not yet considered—namely, their convenience in use. I think that domestic consumers will be prepared, to an even greater extent than in the past, to pay heavily for this advantage of convenience. Whatever progress we may expect to make with the coal fire by making it continuous burning and by reducing the cleaning out of ashes to a simple weekly operation, it will never be as easy to manipulate as a gas or electric fire, and there will always be people who place the saving of time and labour above all other considerations. It would, however, be nothing but wishful thinking to imagine that the use of raw coal can be entirely swept away in our generation, and the country made to rely solely upon gas and electricity for its domestic fuels. If we were to come anywhere near to such a tendency, the effect on the cost of living would be disastrous.

I ought perhaps to say one word about the social aspects of using raw coal. Two things are urged against it, apart from the quite fallacious argument of coal conservation. The first is that unless the coal is processed we lose the valuable and important by-products. About this there is a lot of loose thinking. When coal is carbonized about 10 gallons of tar are obtained, or about 4% of the coal substance. By no means all of this 4% consists of valuable chemicals. On the contrary, three-quarters goes in the form of road tar and pitch, the latter being in times of peace a drag on the market. The valuable chemicals—apart from benzole—derived from coal by carbonization represent less than 1% of the coal treated. Now there are other and better ways of getting valuable chemicals from coal, and it seems to me that it would be more intelligent to burn 95 tons of coal in the raw state and convert 5 tons into chemicals than to carbonize 100 tons and lose 36%—or at best 20%—to make only one ton of chemicals. Chemicals from carbonization are usually justified *because* they are by-products. You cannot turn it the other way round and say the chemicals justify the carbonization. The other social aspect is that of smoke abatement, and here again I see no reason why the coal fire of the future should not be made to emit very much less smoke than it does to-day, just as we have already achieved the smokeless large-scale combustion of coal in power stations and factories.

I entirely agree that smoke abatement is an urgent national problem, but the natural way to solve this problem is to burn coal without making smoke and not to waste a lot of coal in making smokeless fuels.

I have tried within the compass of a short Address to explain to you why I believe that the use of house coal will continue, and why it is neither practicable nor desirable to contemplate the very extensive replacement of house coal by gas or electricity, unless these two industries can greatly increase their efficiency of production, and reduce their costs—and I believe that both these objectives are within the power of research, but such research will have to be undertaken on a greater scale than is contemplated at present. It must be in the national interest that researches into the production and use of coal in the raw state, of gas and electricity, should all be prosecuted with the utmost vigour, but I venture to predict that, in the outcome, the present balance of consumption will not be greatly changed.

Nothing is more encouraging for the future than the present friendly relations which exist between the three industries, and I believe that nothing can do more to cement and strengthen these friendly relations than to discuss freely, before audiences such as this, the technical factors which will determine the future.

Vacation Scheme of the Imperial College

A Conference was recently held at the Imperial College of Science and Technology to review the working of the College Vacation Scheme. Professor H. Levy presided.

Mr. C. S. Garland (Member of the Governing Body) said there were two important features of the Vacation Work Scheme. The first that it was initiated by the students to fill a need which they themselves realized for getting during the course of their college career some knowledge of industry, and in helping them to develop the right mental attitude towards the people with whom they would have to spend much of their time after they left college. It was probably for this reason and the engineers' ambition towards "a job of work well done" that the Scheme was initiated by the engineering students and is still used predominately by them. There was scope for its extension to other branches of science.

Dr. C. C. Paterson (G.E.C. Research Laboratories) remarked that to him it was inevitable that the educational advantages of the Scheme must vary very considerably in the different industrial establishments. Even in the best establishments, what the student learnt of science and technology would depend on the particular job that he got and the particular individuals with whom he worked. One felt that the specific educational value of a vacation course was so obvious and yet so incidental that he was rather tempted to discount it when trying to assess the real value of such a course. It seemed to him that the real advantages were rather of a personal or perhaps of a sociological nature. The student in industry gained by this means a foretaste of the type of occupation which might take up a very large part of his future. In any case the vacation course gave him his opportunity to use his own observation and intuition, and he also had an excellent chance of acquiring, concurrently with his college training, some experience and some appreciation of other aspects of scientific work. His outlook was undoubtedly widened, and he did see that scientific work might have more to it than the textbooks or mere formal experiments suggested. He mixed also with types of individuals who were quite new to him, and he had a part in work in which the getting of definite results was of some importance. It was in these rather intangible ways that the vacation course was probably of most use to the young student. But there was another aspect of the case which made a strong appeal to him. The success of the student's future career, they should all agree, must turn as much upon the nature of his relations with his fellows as upon his own personal scientific or technical abilities. He could not hope to regulate those relations without the knowledge of his fellows which came from direct personal contact with them. An engineer who had served an apprenticeship in the shops had the greatest advantage in carrying responsibility as compared with him who had never been associated with craftsmanship. It was not possible for an ordinary student, of course, in his vacation course to become a craftsman, the time was too far short, but it might be the only opportunity he would have to live and work with craftsmen and to get to know the craftsman's outlook and the nature of the craftsman's skill.

Dr. C. H. Clarke (Lever Brothers and Unilever, Ltd.) said they regarded the Scheme as being of value in attracting the student to an industrial career. In interviewing students for their own industry they find no resistance on the part of the student who was going to practise his science in the laboratory. One of the questions they frequently asked a man was: "If you could select what you would like to do in our industry what would you select?" The answer was: "I would like to go into the research laboratory." If he was told that there was no position available there, he suggested going into any other laboratory they had. The student was confident of carrying on something he had learned at his college or university. If they said: "Will not a job in the works suit you?" it was different; the student did not know what was meant, and it was difficult to describe it to him. He personally thought that the great value of this short period lay in letting the students see what happened in an ordinary works, and hoping to convince them that there were many jobs there which were attractive and which offered a very fine future. There was, of course, the question of remuneration. He had no doubt that there were very different ways of handling this question. Everybody agreed that the student should receive remuneration. It must not be remuneration for work done, although he could say that several of his companies had declared that they had had extraordinarily good value for the remuneration they had paid. But it would be helpful to everyone to have some sort of basis for remunerating these men. If they paid too much it seemed to him that the student might look forward to these courses merely as a means of getting extra pocket-money, and if they paid too little, industry appeared mean. A number of his companies had adopted the policy of paying the appropriate industrial rates for the student's age. He looked upon the Scheme generally as attracting men to industry and ensuring a good supply of well-trained men.

Mr. F. M. Potter (Gas Light and Coke Company) said he would like to sound one word of warning to the Committee. When contacting new firms, they should ensure that the student was going to get some real assistance and facilities for gaining experience. Value from these courses, to his mind, was not obtained by the pre-entry or first-year man. He thought that when peace returned it would be far better to take a length of fishing water and take their pre-entry or first-year students down for fly-fishing, or encourage them to travel abroad, so that they might broaden their minds and be able to talk of something else than their own particular science. In their second and third years they should go into the works, and be given the opportunity to work the type of plant they might be going on to design in their final year at college. The students accepted by the Gas Light and Coke Company had found the course interesting and useful. There were one or two old College students there who saw that the young students got some value out of it. The sort of thing they did was to give them a plan showing the normal duty of a unit process, and they ascertained the actual working conditions on the plant and the operating efficiency. They had the help of the chemist and foreman on the job, to whom the results obtained were not without interest.

The Metropolitan Gas Company of Melbourne have advised Messrs. William Coward & Co., Ltd., that an interim dividend of 5s. per share was declared payable on Feb. 15.

A Meeting of the London and Southern District Junior Association will be held on March 3, at 7 p.m., at Gas Industry House, when Mr. R. P. Donnelly, B.A., B.Sc., A.M.I.Chem.E., will read a Paper on "Boiler Water Treatment."

Post-War Building

In a Paper before a joint meeting of the Road and Materials Group and the London Section of the Society of Chemical Industry and the Institution of Structural Engineers, Dr. E. F. Armstrong said that the metals are going to provide numerous new materials for the home. The applications of stainless steel are as yet only in their infancy, particularly as they will become less costly—aluminium, magnesium, and their alloys will be available where lightness is required. There has been much development of non-ferrous metals and their alloys, and maybe the relative consumption of these and of ferrous raw materials will have altered after the war. We no longer need to tolerate the use of iron, which rusts so rapidly, to the same extent in our homes. Something can be done to lead pipes to prevent them bursting quite so easily when frost comes. The plumbing of the English home has long been a disgrace—all water and other services should be in a central sector of the house, well insulated so that there will be no damage of burst pipes and a minimum pipe run. It should be easy to have a few alternative standard designs for this sector which would cheapen the cost.

Prefabrication, he continued, is a controversial subject largely because it is not understood. There are obstacles to it in the form of building codes and labour practices as well as the difficulty of initial finance. People object to the idea of living in a house common to many thousands, though accepting the fact that most of them live in houses designed and built for someone else. Supporters of the system claim that by using standardized interchangeable parts interior flexibility is obtained, so that the house can be cheaply and easily altered from year to year to fit the changing needs of the family. Its parts can be easily put together and replaced by others in a different design or in a different special arrangement. The interior will not deteriorate through several generations. The central "power unit," which may cost half the total, but on which the convenience of life largely depends, will include the gas and electric inlets, the water supply and sewage connexions, the heating and air conditioning, and will serve directly the kitchen and bathrooms. A criticism of prefabrication is the difficulty of making the joints weatherproof after erection. Although no doubt attempts will be made in housing to rely largely on local materials and products, a large measure of prefabrication away from the site is more probable, particularly when factories now on war work seek peace production.

A number of different methods of construction will have to be tried out both for the house as a whole for various sections and for the details involving individual materials. From such trials, which indeed we believe are largely in hand, the standard practice for post-war building will be established. It is understood that the Building Research Station is charged with this work, and we know that some private firms have also undertaken it. It is obviously of the highest importance if we are to get proper use of the new materials.

The current fuel shortage and the knowledge that fuel is going to be very expensive in the future have drawn attention to the need of conserving heat. No single factor can produce a greater saving in fuel than effective insulation, which is largely neglected in commercial and domestic buildings. There is a valuable Paper on the subject by A. C. Pallot (*J. Roy. Soc. Arts*, 1943, **91**, p. 122), which discusses *inter alia* the main characteristics of insulating materials, all of which depend for their properties on the presence of numerous small air cells in their structure and upon the heat-reflecting properties of the walls of these cells. Those listed are asbestos, magnesia, glass silk, slag wool. All of these are suitable for covering hot pipes and vessels. The insulation of structures is a separate problem, particularly with modern light structures where walls and roofs are comparatively cold and need a higher internal air temperature to counteract the effect. Our apathy to the annual freezing of tanks and pipes in roof spaces may be due to mildness of English winters—the mean temperature throughout the winter in London is 43°F., and on only four days per annum is the mean day temperature below 30°F. on the average. None the less, averages are made up of extremes, and it is surprising we tolerate the incompetence of architect and builder who provide us with such houses. A good deal of insulating can be done with wall boards made in a variety of forms from wood waste, cane fibre, paper, &c. These should be fixed on battens so that an air space exists between the board and the wall or roof; all joints must be sealed to prevent circulation by air currents. Other suitable materials are slabs made of wood, wool cork, asbestos, aluminium, paper, &c.

Mr. Charles Balfour 55, Restalrig Road, Edinburgh 6, has been appointed Scottish Representative for Messrs. David Grant & Co., Ltd., Edinburgh, and takes up his duties at the beginning of March.

Messrs. Sternol, Ltd., Westerham Road, Limpsfield, Surrey, have published an instruction card dealing with the correct method of care, maintenance, and general handling of barrels and drums. The Ministry of Fuel and Power has lately stressed the importance of the careful handling of these containers in view of the shortage of supplies. Copies of the instruction card may be obtained on application to Messrs. Sternol, Ltd.

COMPANY MEETINGS

Commercial Gas Company

The Ordinary General Meeting of the Commercial Gas Company was held on Feb. 24. Mr. Frank H. Jones, chairman, submitted a statement of which the following are extracts:

To-day the Commercial Gas Company is in serious financial straits. No dividends on the Ordinary or Preference stocks of the company have been paid since the interim distribution of August, 1940, and the directors' report tells you that we are unable to recommend dividends for the year 1943.

The heavy bombing in 1940 and 1941 of the seven square miles of London supplied by your undertaking resulted in a large-scale evacuation of the civil population and also of those manufacturers whose premises were damaged by enemy action. Although some have returned, the amount of permanent damage is too great for the population to rise to anything approaching the former density. This has resulted in greatly reduced sales of gas, and although there are signs of recovery we have a very long way to go yet.

The effect of this migration on the company's finances was nothing short of catastrophic; so much so, in fact, that in the autumn of 1940 the serious plight of the company was laid before certain Cabinet Ministers. This approach elicited a verbal order that the company should carry on supplying gas, but without increasing the price to an economic level, and should continue to pay Debenture stock interest which was not being earned.

I must emphasize that there was a considerable measure of chaos in London at the time, and your board felt not only that nothing more definite could reasonably be expected of the Government then, but that the company should refrain from taking any drastic steps to meet the financial deficiency which was accumulating. From that time the company was compelled to rely upon its bankers for money and the bank loan began to rise at a rapid rate. In October of 1941 the Board of Trade ordered a special investigation of the company's financial position and resources by the Official Auditor. This investigation was duly carried out, but the Board of Trade did not communicate the findings to the company.

In June, 1942, the Ministry of Fuel and Power began to make loans to the company. These loans were free of interest for the duration of the war, but thereafter on terms to be prescribed. This method of assistance was not acceptable to your board, but we were anxious to avoid embarrassing the Government or the newly formed Ministry of Fuel and Power by pressing for a definite subsidy. We considered that ultimately the Government would admit the justice of a claim for subsidy.

The situation was allowed to stand, therefore, until August, 1943, when it was decided that the Company's post-war plans absolutely necessitated a definite decision on the financial issue. The net revenue account was showing a large deficiency made up of trading losses and Debenture and other interest payments which had not been earned. Furthermore, it was apparent that the company would suffer from shortage of money for redevelopment during the immediate post-war period. Discussions were initiated with the Ministry of Fuel and Power and the company's case for an adequate subsidy was carefully submitted. I regret to say that the Ministry refused to admit any assistance except by way of the loans which they were already making.

I cannot adequately express my bitter disappointment at this decision. At the request of Cabinet Ministers the company carried on the supply of gas through most difficult times under appalling conditions and loyally observed the further request not to increase the price of gas. I should say, in parentheses, that the price of gas was advanced when increases took place generally in the Metropolis but not otherwise. Your board recognized how invidious and unfair it would be to make the suffering East Londoner of 1940 pay a much higher price for his gas than others who were more fortunately placed, and we also recognized the absolute necessity of maintaining the gas supply in the interests of public morale.

Nevertheless a large increase in the price of gas would have been imposed but for the Government instruction, and we do not recognize that the company should be saddled with a heavy burden in consequence of this instruction. While we could not perhaps expect to go on paying ordinary dividends, we could at least expect to be kept solvent.

The Government has recognized the subsidy principle for many commodities—the late Sir Kingsley Wood referred to this necessity in his 1941 Budget speech. Indeed, in that speech the Chancellor stated that the general policy of restricting price increases to a minimum would apply to the prices of coal, gas, and electricity. I doubt whether any Government could reasonably expect a large company to carry on at a heavy loss in order that its commodities may be supplied without price increases. Yet this is what the Ministry of Fuel and Power expects us to do.

Your company cannot follow the practice of the local authority electric supply undertakings, with whom we compete, of charging deficiencies to a General Rate Fund, the overall deficiency of which is met by the Government—three-quarters by way of grant and one-quarter by way of interest-free loan. Thus does the Government treatment of the gas and electricity supply in the East End of London

(*Continued on p. 283*)

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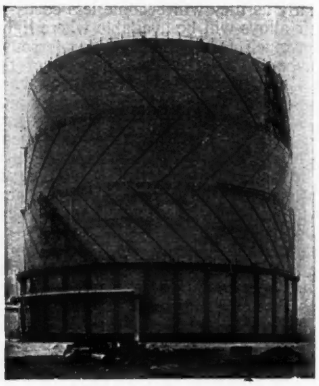

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differ. I do not yet despair of a just settlement in this matter, and we are continually working on your behalf.

The report of the directors was received and adopted.

South Metropolitan Gas Company

The Annual General Meeting of the South Metropolitan Gas Company was held on Feb. 23. Mr. Frank H. Jones, president, was in the chair. The following are extracts from the President's statement circulated with the report: Our progress has continued, and your directors are glad to recommend that the full dividends be paid on the Preference stocks and a dividend of 3% on the Ordinary stock. Our basic dividend is 5%, so that we are still short of the sum which Parliament has considered a reasonable basic return on our money, but I believe that, in all the circumstances, you will not be displeased with the results.

For this improvement in our fortunes we have again to thank chiefly the united efforts of the Allied Nations, who have shown that they are now able to dictate the whole movement of the war on all fronts and in all the elements.

The price of gas remained unchanged in 1943, in spite of increases of wages in which we have followed national awards. The latest addition of 3s. 3½d. a ton to the price of our coal, which became effective from the first of the present month, has, however, compelled the company to apply to the Ministry of Fuel and Power for licence to increase the price of gas.

For some years there has been close co-operation between the South Metropolitan, Wandsworth, and South Suburban Companies; as you know, we have supplied gas in bulk to the South Suburban under statutory agreement since 1928. The Greater South London Gas Corporation, Ltd., was formed last September, with the modest nominal capital of £100, to make this co-operation still more effective, and to provide its members with the means whereby they may share more readily the particular advantages which each possesses. Central purchasing and testing of raw materials, bulk supplies of gas and the co-operative working up and disposal of by-products are some of the subjects which may be expected to fall within the purview of the corporation. It is not a financial merger, and all the companies will retain their identity.

From mention of the corporation I am led to refer to post-war planning on a larger scale, as discussed in the Planning Report of the British Gas Federation, which was prepared at the instigation of the Government and forwarded to the Minister of Fuel and Power last October. I cannot attempt here to give even a summary of its main conclusions; the whole has appeared in the technical press; but this I would say. It seems to me that an industry must be pretty healthy if it can analyse and discuss itself as candidly and constructively as does the Gas Industry in this report. The committee who drafted the report and the Federation have earned the gratitude of all for their labours.

On one of the chief contentions there will, I am sure, be the widest agreement, and that is the insistence in the report on the fundamental need for co-operation between the three fuel industries supplying the public with solid fuel, gas, and electricity, and the vital necessity of a national policy, such as might evolve from the creation of a National Fuel Advisory Council, for the most economical use of the nation's fuel resources. It is understood—and the news will be welcomed by many—that the Minister proposes to set up such a council. There is clearly important work for the British Gas Federation to do in the months that lie ahead, and I know that you will wish your General Manager well in the responsible office which, as Chairman of the Council of the Federation, he has just taken over from that great figure in the Gas Industry, my friend Sir David Milne-Watson.

The proposed dividends were approved.

Portsmouth and Gosport Gas Company

"We have had a satisfactory year, and though there has been a steady increase in the sale of gas, the vast majority of consumers are doing their best to respond to the Government's request for economy in all forms of fuel," observed the Chairman of Portsmouth and Gosport Gas Company (Alderman F. Beddow, D.Sc., J.P.) at the annual ordinary general meeting of stockholders, held at the Company's offices on Feb. 18.

After referring to the loss to the Company of the death of Ald. L. N. Blake, who had given useful service on the board for five years, the Chairman explained that the increased consumption of gas was mainly due to the return of people who had evacuated because of the war, and to the greater consumption in Government undertakings and canteens.

In addition, he said, there were many husbands and wives on work of national importance, and in the evenings and early mornings they naturally turned to the quickest and easiest method of heating their homes. There was no better medium than gas to meet their needs.

The price of coal had been increased by 1s. per ton during the year, and a further 3s. per ton last week, yet the Company had been able to refrain from increasing the price of gas from the comparatively low figure of 11½d. per therm. The last increase in price was nearly three years ago.

Owing to restrictions on the sale of appliances, the Company had been able to invest £55,000 in Government Savings Bonds, either on behalf of the Company or the pension funds of the employees. Market prices of the Company's shares had appreciated considerably.

The Chairman stated that Mr. Thomas Carmichael, the General Manager, had completed 25 years' service, and the Directors had appointed him as Managing Director, an honour well deserved.

Among the retirements was Mr. David T. Marwick, Superintendent of the Hilsea Works, who had served the Company well for 25 years.

Tribute was paid to the work of Mr. E. Allison, the Engineer, and Mr. R. W. Hewitt, the Secretary, and the Chairman praised the members of the Company's unit of Home Guard, who had been assiduous in guarding the works during blackout hours. Special mention was made of the efficiency of the Fire Guard (including the women of the staff) and A.R.P.

The Chairman moved that dividends at the rate of 4% on the 4% and 5% on the 5% Preference stocks, and of 5% on the 5% Maximum stock, and of 7¼% on the Consolidated stock, all less income tax, be paid for the year ended Dec. 31, 1943, and that such dividends after deduction of the interim payments made on Sept. 1 last be made on March 1.

Mr. Carmichael, seconding, said the employees had worked long hours, often under trying conditions, and he endorsed all the Chairman had said in appreciation of their efforts. He especially thanked the employees' representatives of the Welfare Committee, the accredited Trade Union representatives, and all with whom the company had consulted on various questions concerning the war effort, for their successful endeavours and help.

He considered the results of the year highly satisfactory. There were no major repairs in arrears, the statutory obligations as to purity of the gas supply and calorific value had been carried out, and the reserve fund for the equalization of dividends remained intact.

The motion was carried.

Major H. D. Gilbert, J.P., was re-elected as a Director, and Messrs. Edmonds, Casey & Co. were reappointed as Auditors.

Newcastle and Gateshead Gas Company

The Annual Ordinary General Meeting of the Newcastle-upon-Tyne and Gateshead Gas Company was held on Feb. 22 at Newcastle-upon-Tyne. Sir Cecil Algernon Cochrane, M.A., D.C.L. (the Chairman), presided.

The Chairman, in the course of his remarks, said: It is with sincere regret that I have to refer to the loss sustained by the Company through the death, in March last, of Mr. William Anderson Armstrong, who joined the board in 1938 upon the acquisition of the South Shields Company, of which he was then Deputy-Chairman. The vacancy thus created has been filled by the appointment of Colonel Robert Chapman. Under the provisions of the Gas Undertakings Act, 1934, your Directors have appointed Mr. Edward Crowther, General Manager and Chief Engineer of the Company, to a seat on the Board. Major John D. Cowen's military duties continue to prevent his active participation in the affairs of the Company; it is with great pleasure that I am able to inform you that he has been awarded the Military Cross for gallant and distinguished services in the Middle East.

Your Directors recommend the payment of a final dividend of £2% on the Preference stock, and of £2 17s. 6d.% on the Ordinary stock, making £4% and £5 7s. 6d.% respectively for the year, both less income tax at the current rate. If these recommendations, which are similar to those of a year ago, meet with your approval, the even course of the Company's dividend distribution will have been maintained with but one minor variation for a period of 15 consecutive years. This is the more noteworthy when one considers that since 1939 receipts per therm of all gas sold have advanced by but a small fraction of the concurrent advances which we have had to meet in the cost of coal, our principal raw material, too much of which, I may add, has also deteriorated appreciably in quality.

A further matter to which I may properly refer concerns the South Shields section of the Company's area. The Order of 1937, which sanctioned the absorption of the South Shields Gas Company, provided that at the end of five years meter rentals, discounts, and rebates in South Shields should become similar to those in the Newcastle area. This unification duly took place at the beginning of 1943, but the present conditions prevent either the Company or the consumers of South Shields from taking full advantage of the new terms. I am confident, however, that this development is merely deferred, and that its benefits will be appreciated when peace is restored.

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GAS PRODUCTS PRICES

The London Market Feb. 28.

All Coal Tar Products are in good demand, and Pitch in the London area remains about 45s.

The new Coal Tar Products Prices Order, 1943 (S. R. & O. 1528), came into force on Nov. 15, fixing the prices at which Coal Tar Oils may be sold for various specified purposes. It also confirms the prices which may be charged for other Coal Tar Products under earlier Orders.

An Order entitled The Control of Toluene (No. 3) Order, 1943 (S. R. & O. 1943, No. 976), came into force on July 20, and introduced certain changes in the prices for different grades of Toluene.

There are no changes to report in the prices of Coal Tar Products.

The Provinces Feb. 28.

The average prices of gas-works products during the week were: Pitch and Crude Tar,* Toluole, naked, North, 90's, 1s. 11d. to 2s. 1d., pure, 2s. 7½d. (controlled by the Control of Toluene No. 3 Order, dated July 14, 1943, operative from July 20, 1943). Naphtha and Xylole controlled by the Coal Tar Naphtha and Xylole Order, 1943, dated May 31 (S. R. & O., 1943, No. 768), operative from June 1. Carbolic acid, 60's, naphthalene, anthracene, creosote oil (hydrogenation), coal tar oils (timber preservation, &c.), and strained anthracene oil controlled by the Coal Tar Products Prices Order, 1943, dated Oct. 20, 1943 (S. R. & O. 1943, No. 1528), operative from Nov. 15, 1943.

* In regard to pitch and crude tar prices we would ask readers to refer to the editorial note on p. 396 of the "JOURNAL" for Sept. 10, 1941.

Scotland Feb. 26.

Market continues active with prices unchanged. Refined tar*: Yield to distillers is 4½d. per gallon *ex* Works, naked. Creosote oil: Timber preserving quality,* 5½d. to 6½d.; hydrogenation oil,* 5½d.; low gravity or virgin oil,† 7½d. to 7½d.; benzol absorbing oil,* 6½d. to 8d. per gallon. Refined cresylic acid* is 3s. 6d. to 4s. 6d. per gallon *ex* Works, naked, according to quality. Crude naphtha†: 6½d. to 7d. per gallon. Solvent naphtha*: Basic prices delivered in bulk, 90/160 grade, 2s. 8d., and 90/190 Heavy naphtha, Unrectified, 1s. 10½d.; Rectified, 2s. 3d. per gallon. Pyridine†: 90/160 grade, 13s., and 90/140 grade, 15s. per gallon.

* Price controlled. † Uncontrolled.

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